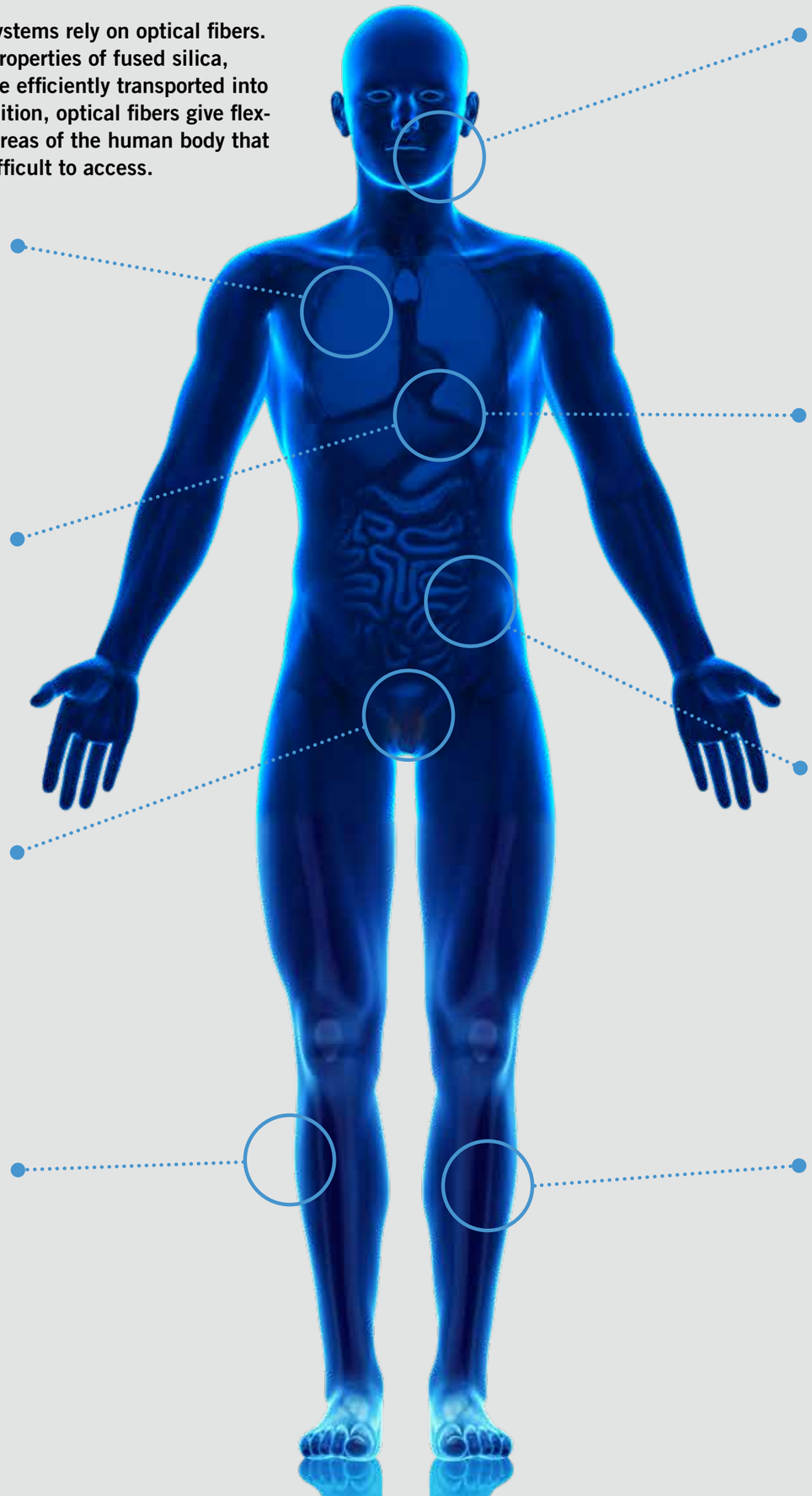
Heraeus

Specialty Fiber Preforms for Medical Applications

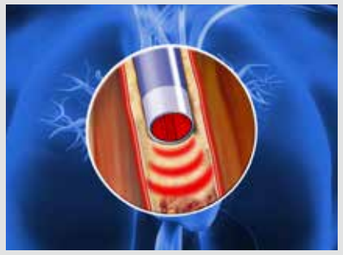
In modern medicine, minimal invasive surgeries are increasingly important. The dominant reason being the shorter recovery time of patients compared to standard procedures. Additionally, smaller wounds also mean lower risk of complications.

Many surgical systems rely on optical fibers. Due to unique properties of fused silica, laser light can be efficiently transported into the body. In addition, optical fibers give flexibility to reach areas of the human body that are otherwise difficult to access.



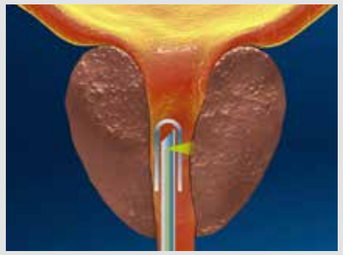
Particle detection

The detection of small particles like viruses are getting more and more important to keep society and the economy secure and people healthy. We have developed a nano channel fiber which allows detection of particles as small as 15 nm without any markers and smaller than the wavelength of light used to analyze these particles.



Imaging and Endoscopy

Arterial clogging leads to serious diseases and can be prevented by minimal invasive surgeries. In preparation of these surgeries it is important to understand the local morphology.
A new technique is intravascular optical coherence tomography. A 1300 nm laser illuminates the blood vessel through an optical fiber and the backscattered signal is analyzed. We have preforms optimized for applications like OCT for all wavelength ranges.



Enlarged prostate disease

Benign Prostatic Hyperplasia is a painful disease. Long recovery times and bleeding are side effects of classic treatments. Modern ambulant laser surgery with short recovery time is an alternative. A 532 nm laser evaporates the pathological tissue causing coagulation simultaneously to stop the bleeding. Heraeus offers high performing materials suitable for the visible transmission range.

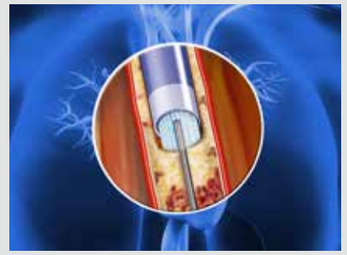
Tattoo removal

To have a tattoo is common these days. The need for plastic surgery to remove tattoos has also risen. With laser irradiation in the visible light spectrum tattoos can be removed without leaving scars. This is done by laser irradiation with special wavelengths matched to the ink pigment. To meet these requirements Heraeus offers preforms for optical fibers with a broad transmission range.

Endodontics treatment

Periodontology and endodontics are common dental treatments. Beside soft tissue surgery, lasers are used to reduce dental root germ load. The tooth root fine, ramified channel system is an ideal environment for bacteria and the main reason for re-infection. After a conventional therapy, the root canal can be treated by a 445 nm laser to reduce the germ load and increase the treatments success rate. The laser is transmitted through a thin optical fiber into the root canal. For all kind of applications and wavelengths we offer adapted materials.

Arterial blockage



Blockage of the circulation in arteries can lead to heart attack or stroke. To remove the blockage, laser catheters can be used. A catheter guides a UV laser pulse through an optical fiber to the blockages to resolve it in the vessel. Due to the short wavelength the risk of damages to the artery is reduced as it does not penetrate deeply into the wall. Heraeus offers solutions with high OH materials with highest UV performance.

Lithotripsy of gall, kidney or bladder stones

Gallstones are hardened deposits of digestive fluid in a gallbladder. If they block a duct, immediate treatment is needed. IR laser treatment to break gallstones into fragments is state of the art. Our customers benefit from solutions for the removal of gallstones or kidney stones even in the very narrow passages of the kidneys or gallbladder due to our high NA products. We ensure excellent laser transmission with our low OH grades for optical fibers. Beside HoYAG lasers, Tm fiber lasers are used for these applications. For the manufacturing of Tm laser fibers, we offer tubes with high precision.

Vein disease

Pressure on legs' vessels by dysfunctional venous valves cause deformation and enlarged volume. Less painful and faster recovering methods use lasers. The tip of a fiber catheter is formed to create a radial emission. The vein wall absorbs the laser light, collapses and residual material is resorbed by the body. Heraeus offers low OH preforms with highest transmission in the IR range.

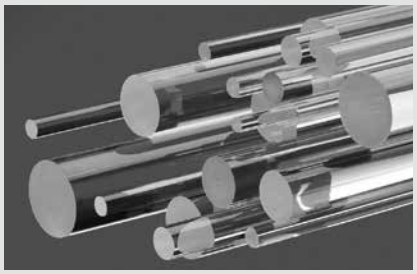
Our commitment to quality

In the medical area reliability and consistent quality are core requirements for market participants. Heraeus has a long tradition as supplier in the medical area. We are certified by ISO 9001:2015 and our behavior reflects the principles of the Heraeus Conamic Quality Handbook.

Tailored products for your specific application

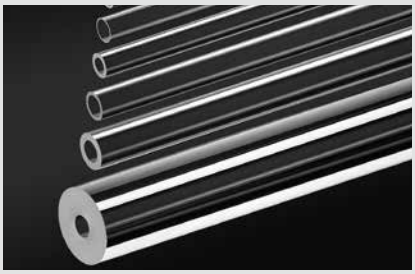
PREFORMS

For each applications Heraeus is able to offer a tailored preform design for geometry, refractive index steps and transmission window based on your requirements. We can offer different core materials depending on the wavelength you want to use and numerical aperture you need. Finally, we can adjust the shape of core and cladding fitting to your needs.



CORE MATERIALS / RODS

For many applications a very high numerical aperture is the critical factor and not highest power and transmission due to short fiber lengths. Fibers with a pure silica core and a fluorinated polymer are the perfect solution. Heraeus offers a wide range of suitable fused silica core materials matching your operational wavelength.



TUBES

Heraeus offers high purity and high precision fused silica tubes which can be applied in chemical vapor deposition processes to produce special doped preforms e.g. for Tm laser systems. They are also used to draw capillaries for chromatography systems.

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The data given in this brochure are valid for December 2020. Subject to alterations.

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